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EXAMINER	
TRAN, KHANH C	

ART UNIT	PAPER NUMBER
2631	

DATE MAILED: 03/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	09/746,823	BENGTSSON ET AL.	
	Examiner	Art Unit	
	Khanh Tran	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-10,12-20,22-28 and 30-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-10,12-20,22-28 and 30-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 December 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The Amendment filed on 10/05/2004. Claims 1, 3-10, 12-20, 22-28, 30-37 are pending in this Office action.

Response to Arguments

2. Applicant's arguments, see pages the Remarks, filed on 10/05/2004, with respect to the rejection(s)of claim(s) 1, 3-10, 16-20, 22-28, 30 and 34-36 under 35 U.S.C 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Perrett et al. U.S. Patent 6,018,275, Gailus et al. U.S. Patent 6,449,465 B1, and Cordoba U.S. Patent 6,671,337 B1.

3. Claims 13-15 and 31-33 were indicated allowable in previous Office action, however, upon further consideration, a new ground(s) of rejection is made in view of Perrett et al. U.S. Patent 6,018,275, Gailus et al. U.S. Patent 6,449,465 B1, and Cordoba U.S. Patent 6,671,337 B1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3-6, 8-10, 12, 16, 18-20, 22-28, 30 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perrett et al. U.S. Patent 6,018,275 in view of Gailus et al. U.S. Patent 6,449,465 B1.

Regarding claim 1, Perrett et al. teaches an embodiment of a transmitter shown in figure 4. The transmitter includes a phase locked loop (PLL) 30, which is similar to the PLL in figure 3. In column 4 lines 5-15, the PLL 30 (shown in both figures 3 and 4) includes a voltage controlled oscillator 34, which has a controlled oscillator input, a controlled oscillator output. Referring to figure 4, the feedback loop comprises a mixer 35 responsive to a frequency source 37 that corresponds to the claimed local oscillator, a main frequency divider 35, and a modulator 39. The modulator 39 is in the feedback loop between the mixer 35 and the controlled oscillator input of VCO 34. In column 7 lines 40-50, Perrett et al. expresses that the modulator 39 can comprise a conventional IQ modulator to modulate a complex signal, and thus provide amplitude and phase modulation.

Figure 4 shows a power amplifier 32 having a signal input, a signal output. Figure 7 further shows another embodiment wherein the power amplifier 72 having an amplitude control input to which the magnitude part of the signal $f_{bb}(R)$ is applied to vary the amplitude of its output signal; see column 7, lines 30-45. The signal input of power amplifier 72 is responsive to the output of VCO 34.

Perrett et al. does not teach a digital signal processor (DSP) that generates in-phase, quadrature-phase and amplitude signals from a baseband

signal as claimed. Gailus et al. teaches a method and apparatus for linear amplification of a radio frequency signal. Referring to figure 4, Gailus et al. teaches a linear transmitter 306 including a DSP 401, which functions as an information source to generate a digital baseband input signal. The digital baseband input signal, preferably a quadrature modulation information signal, includes an in-phase (I) component 404 and a quadrature (Q) component 403. Perett et al. invention differs from Gailus et al. invention in that Perett et al. does not teach a DSP that generates in-phase, quadrature-phase and amplitude signals from a baseband signal. Nevertheless, as taught in Gailus et al. invention, DSP 401, which functions as an information source to generate a digital baseband input signal including an in-phase (I) component 404 and a quadrature (Q) component 403. In light of that, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Perett et al. transmitter can be modified to utilize the DSP as taught Gailus et al. for generating the in-phase (I) component and a quadrature (Q) component. The motivation is that Perett et al. employs a conventional IQ modulator to modulate a complex signal and DSP as taught Gailus et al. can function as an information source to generate in-phase (I) component and a quadrature (Q) component.

Regarding claim 3, in column 7 lines 30-46 of Perrett et al. invention, the baseband signal f_{bb} is decomposed into a complex signal in which the phase part of the signal, $f_{bb}(\theta)$, is applied to an input of the phase/frequency modulator 39 and the

magnitude part of the signal, $f_{bb}(\theta)$, is applied to the variable power amplifier 72 to vary the amplitude of amplifier output. As appreciated by one of ordinary skill in the art, the magnitude part is the normalized amplitude signal. And because the baseband signal f_{bb} can be decomposed into a complex signal, the baseband signal f_{bb} includes normalized in-phase and quadrature-phase component signals.

Regarding claim 4, as recited in claim 3, the baseband signal f_{bb} can be decomposed into a complex signal including the magnitude part of the signal, $f_{bb}(\theta)$, and the phase part of the signal, $f_{bb}(\theta)$. In light of that, the magnitude part of the signal, $f_{bb}(\theta)$, and the phase part of the signal, $f_{bb}(\theta)$ can generate the normalized in-phase signal as one of a cosine and a sine of an angle theta, and the normalized quadrature-phase signal as the other of a cosine and a sine of an angle theta, where theta is angle whose tangent is the quadrature-phase signal divided by the in-phase signal, as claimed in the application claim.

Regarding claim 5, the magnitude part of the signal, $f_{bb}(\theta)$, is inherently calculated as a square root of a sum of the in-phase signal squared and the quadrature-phase signal squared as claimed in the application claim.

Regarding claim 6, referring to figure 7 of Perrett et al. invention, in column 7 lines 30-46, the magnitude part of the signal, $f_{bb}(\theta)$, is applied to the variable power amplifier 72 to vary the amplitude of amplifier output. In view of that, the magnitude part

of the signal, $f_{bb}(\theta)$, corresponds to the claimed power control signal, wherein the amplitude control input of the power amplifier is responsive to the magnitude part of the signal, $f_{bb}(\theta)$.

Regarding claim 8, referring to figure 4 of Perrett et al. invention, a transmit antenna is responsive to output of the PA 32 as claimed in the application claim. Inherently, Perrett et al. does not expressly teach a user interface that generates the baseband signal in response to user input. Because the baseband signal f_{bb} is generated and provided to the modulator 39, it would have been obvious for one of ordinary skill in the art at the time the invention was made that an user interface is employed to generate the baseband signal in response to user input. The motivation for using a user interface is that the baseband signal f_{bb} is generated and provided to the modulator 39.

Regarding claim 9, referring to figure 4 of Perrett et al. invention, the PA 32 is a power amplifier.

Regarding claim 10, referring to figure 4 of Perrett et al. invention, as recited in claim 1, the transmitter includes a phase locked loop (PLL) 30, which is similar to the PLL in figure 3. In column 4 lines 5-15, the PLL 30 (shown in both figures 3 and 4) includes a voltage controlled oscillator 34, which has a controlled oscillator input, a controlled oscillator output. Referring to figure 4, the feedback

loop comprises a mixer 35 responsive to a frequency source 37 that corresponds to the claimed local oscillator, a main frequency divider 35, and a modulator 39. The modulator 39 is in the feedback loop between the mixer 35 and the controlled oscillator input of VCO 34. In column 7 lines 40-50, Perrett et al. expresses that the modulator 39 can comprise a conventional IQ modulator to modulate a complex signal. In view of that, the modulator 39 corresponds to the claimed quadrature modulator.

Perrett et al. does not expressly teach a phase tracking subsystem as claimed in the application claim. Nevertheless, the PLL 30 responsive to the quadrature modulator 39 produces a phase signal that is responsive the phase changes in the modulated signal. Because the PLL 30 performs function of the phase tracking subsystem as specified in the claim, a person of ordinary skill in the art would have recognized the interchangeability of the PLL 30 as taught by Perrett et al. for the corresponding phase tracking subsystem as specified in the claim. Furthermore, the modulator 39 provides phase modulation to the PLL 30, therefore, the generated phase signal is independent of the amplitude changes in the modulated signal.

Perrett et al. does not expressly teach an amplitude tracking subsystem as set forth in the claim. However, in figure 7, Figure 7 further shows different embodiment wherein the power amplifier 72 having an input responsive to output of VCO 34, an output, and an amplitude control input to which the magnitude part of the signal $f_{bb}(R)$ is applied to vary the amplitude of its output signal; see

column 7, lines 30-45. The power amplifier 72 corresponds to the claimed amplifier. Furthermore, in column 2 lines 1-25, prior art of figure 1 in Gailus et al. discusses an envelope-elimination-and-restoration (EER) system taught by Frederick Raab, wherein the transmitter 100 in figure 1 includes a top feedback path that provides amplitude (envelope) correction and a bottom feedback path that provides phase correction. The top feedback path includes two envelope detectors 104, 106 to generate an amplitude modulation signal for providing a power control signal to an transmit amplifier as shown in figure 1. Perrett et al. and prior art teachings are in the same field of endeavor. Perrett et al. and prior art of figure 1 disclose a transmitter that is capable of generating amplitude modulation as well as phase modulation. In light of the foregoing discussion, it would have been obvious for one of ordinary skill in the art at the time the invention was made that the transmitter as taught by Perrett et al. can be modified to include envelope detectors, as taught by prior art of figure 1 to generate an amplitude modulation signal for providing a power control signal to the transmit amplifier as shown in figure 7. The motivation is that Perrett et al. expressly teaches utilization of amplitude modulation system to vary the amplitude of the transmit power amplifier. The top feedback path includes two envelope detectors 104, 106 for generating an amplitude modulation signal constitutes an amplitude tracking subsystem as claimed in the instant application. Since envelope detectors responsive to the quadrature modulator produce an amplitude modulation signal in response to the amplitude change, the amplitude

modulation signal is independent of phase changes in the modulated signal as appreciated by one of ordinary skill in the art.

Figure 7 of Perrett et al. invention further shows another embodiment wherein the power amplifier 72 having an amplitude control input to which the magnitude part of the signal $f_{bb}(R)$ is applied to vary the amplitude of its output signal; see column 7, lines 30-45. The signal input of power amplifier 72 is responsive to the output of VCO 34. In light of the foregoing, the power amplifier as taught by Perrett et al. correspond to the claimed amplifier.

Regarding claim 12, referring to prior art of figure 1 in Gailus et al. invention, the top feedback path including two envelope detectors 104 106 for generating an amplitude modulation signal further comprises a plurality of amplifiers (not labeled in the figure). In light of the foregoing disclosure, envelope detectors 104 106 and amplifiers constitute an automatic gain control subsystem as claimed in the application claim.

Regarding claim 16, referring to prior art of figure 1 in Gailus et al. invention, the transmitter 100 includes a limiter 110 in the feedback loop of the phase locked loop. With the combining teachings of Perrett et al. and prior art of figure 1, Perrett et al. teaches a modulator 39 included in the feedback loop as shown in figure 4. In view of that, the limiter 110 can be modified to be between the modulator and the PLL.

Regarding claim 18, claim 18 is rejected on the same ground as for claim 8 because of similar scope.

Regarding claim 19, claim 19 is rejected on the same ground as for claim 9 because of similar scope.

Regarding claim 20, claim 1 discloses a modulation system including elements performing steps in claim 20. In view of that, claim 20 is rejected on the same ground as for claim 1 because of similar scope.

Regarding claim 22, claim 22 is rejected on the same ground as for claim 3 because of similar scope.

Regarding claim 23, claim 23 is rejected on the same ground as for claim 4 because of similar scope.

Regarding claim 24, claim 24 is rejected on the same ground as for claim 5 because of similar scope.

Regarding claim 25, claim 25 is rejected on the same ground as for claim 6 because of similar scope.

Regarding claim 26, claim 26 is rejected on the same ground as for claim 7 because of similar scope.

Regarding claim 27, claim 27 is rejected on the same ground as for claim 8 because of similar scope.

Regarding claim 28, claim 10 discloses a modulation system including elements performing steps in claim 28. In view of that, claim 28 is rejected on the same ground as for claim 10 because of similar scope.

Regarding claim 30, claim 12 discloses a modulation system including elements performing steps in claim 30. In view of that, claim 30 is rejected on the same ground as for claim 12 because of similar scope.

Regarding claim 34, claim 16 discloses a modulation system including elements performing steps in claim 34. In view of that, claim 34 is rejected on the same ground as for claim 16 because of similar scope.

Regarding claim 35, claim 17 discloses a modulation system including elements performing steps in claim 35. In view of that, claim 35 is rejected on the same ground as for claim 17 because of similar scope.

Regarding claim 36, claim 18 discloses a modulation system including elements performing steps in claim 36. In view of that, claim 36 is rejected on the same ground as for claim 18 because of similar scope.

Regarding claim 37, claim 37 is rejected on the same ground as for claim 1 because of similar scope.

5. Claims 13-15, 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perrett et al. U.S. Patent 6,018,275 in view of Cordoba U.S. Patent 6,671,337 B1.

Regarding claim 13, referring to figure 4 of Perrett et al. invention, as recited in claim 1, the transmitter includes a phase locked loop (PLL) 30, which is similar to the PLL in figure 3. In column 4 lines 5-15, the PLL 30 (shown in both figures 3 and 4) includes a voltage controlled oscillator 34, which has a controlled oscillator input, a controlled oscillator output. Referring to figure 4, the feedback loop comprises a mixer 35 responsive to a frequency source 37 that corresponds to the claimed local oscillator, a main frequency divider 35, and a modulator 39. The modulator 39 is in the feedback loop between the mixer 35 and the controlled oscillator input of VCO 34. In column 7 lines 40-50, Perrett et al. expresses that the modulator 39 can comprise a conventional IQ modulator to modulate a complex signal. In view of that, the modulator 39 corresponds to the claimed quadrature modulator.

Perrett et al. does not expressly teach a phase tracking subsystem as claimed in the application claim. Nevertheless, the PLL 30 responsive to the quadrature modulator 39 produces a phase signal that is responsive the phase changes in the modulated signal. Because the PLL 30 performs function of the phase tracking subsystem as specified in the claim, a person of ordinary skill in the art would have recognized the interchangeability of the PLL 30 as taught by Perrett et al. for the corresponding phase tracking subsystem as specified in the claim. Furthermore, the modulator 39 provides phase modulation to the PLL 30, therefore, the generated phase signal is independent of the amplitude changes in the modulated signal.

Perrett et al. does not expressly teach an amplitude tracking subsystem as set forth in the claim. However, in figure 7, Figure 7 further shows different embodiment wherein the power amplifier 72 having an input responsive to output of VCO 34, an output, and an amplitude control input to which the magnitude part of the signal $f_{bb}(R)$ is applied to vary the amplitude of its output signal; see column 7, lines 30-45. The power amplifier 72 corresponds to the claimed amplifier. Furthermore, referring to figure 1 of Cordoba invention, in column 3 line 20-67, the transmitter includes a quadrature modulator 2, a phase locked loop (PLL) 12, and a variable gain amplifier 11. The transmitter 1 further comprises an amplitude restoration arrangement 20 for generating an amplitude modulation signal, the amplitude restoration arrangement 20 including envelope detectors 22 23 and comparator 24 for comparing output signals generated by the envelope

detectors 22 and 23 and providing a variable gain control signal VG to a variable gain control input of the transmit power amplifier 11. Perrett et al. and Cordoba teachings are in the same field of endeavor. Perrett et al. and Cordoba disclose a transmitter that is capable of generating amplitude modulation as well as phase modulation. Perrett et al. invention differs from Cordoba invention in that Perrett et al. incorporates a quadrature modulator in the PLL. Nevertheless, in light of the foregoing discussion, it would have been obvious for one of ordinary skill in the art at the time the invention was made that the transmitter as taught by Perrett et al. can be modified to include envelope detectors and comparator, as taught by Cordoba to generate an amplitude modulation signal for providing a power control signal to the transmit amplifier as shown in figure 7. The motivation is that Perrett et al. expressly teaches utilization of amplitude modulation system to vary the amplitude of the transmit power amplifier. The envelope detectors and comparator, as taught in Cordoba invention, for generating an amplitude modulation signal constitutes an amplitude tracking subsystem as claimed in the instant application. Envelope detector 22, corresponding to the claimed first envelope detector, is responsive to the modulated signal. Envelope detector 23, corresponding to the claimed second envelope detector, is responsive to the PLL 12. The comparator 24, corresponding to the claimed comparator, is responsive to the first envelope detector and second envelope detector to produce an amplitude modulation signal. Envelope detectors 22 23 and comparator 24 also

correspond to the claimed automatic gain control subsystem as appreciated by one of ordinary skill in the art.

Figure 7 of Perrett et al. invention further shows another embodiment wherein the power amplifier 72 having an amplitude control input to which the magnitude part of the signal $f_{bb}(R)$ is applied to vary the amplitude of its output signal; see column 7, lines 30-45. The signal input of power amplifier 72 is responsive to the output of VCO 34. In light of the foregoing, the power amplifier as taught by Perrett et al. correspond to the claimed amplifier.

Regarding claim 14, claim 14 is rejected on the same ground as for claim 13 because of similar scope. Furthermore, referring to figure 1 of Cordoba invention,

Envelope detector 22, corresponding to the claimed first envelope detector, responsive to the modulated signal;

Envelope detector 23, corresponding to the claimed second envelope detector, is responsive to output of amplifier 11 through the feedback loop;

Comparator 24, corresponding to the claimed comparator, is responsive to the first envelope detector and second envelope detector to produce an amplitude modulation signal.

Regarding claim 15, claim 15 is rejected on the same ground as for claim 14 because of similar scope.

Regarding claim 31, claim 13 discloses a modulation system including elements performing steps in claim 31. In view of that, claim 31 is rejected on the same ground as for claim 13 because of similar scope.

Regarding claim 32, claim 14 discloses a modulation system including elements performing steps in claim 32. In view of that, claim 32 is rejected on the same ground as for claim 14 because of similar scope.

Regarding claim 33, claim 15 discloses a modulation system including elements performing steps in claim 33. In view of that, claim 33 is rejected on the same ground as for claim 15 because of similar scope.

6. Claims 7, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perrett et al. U.S. Patent 6,018,275 and Gailus et al. U.S. Patent 6,449,465 B1 as applied to claims 1 and 10 above, and further in view of admitted prior art of figure 3 of the original disclosure.

Regarding claim 7, Perrett et al. does not teach another power amplifier as set forth in the claim. Admitted prior art of figure 3 in the original disclosure shows a power amplifier 226 connected to an antenna 232, the power amplifier 226 being after a variable gain amplifier. In view of that, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Perrett et al. transmitter in figure 4

can be modified to include a power amplifier such as disclosed in admitted prior art. The motivation is that as known in the art, power amplifier is employed to amplifier the modulated signal before transmission.

Regarding claim 17, claim 17 is rejected on the same ground as for claim 7 because of similar scope.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Montalvo et al. U.S. Patent 6,693,969 B1 discloses "Phase-Locked Loop "Methods And Structures For Generating Modulated Communication Signals With Nonconstant Envelopes".

Broughton U.S. Patent 6,693,969 B1 discloses "Image Rejection Downconverter For A Translation Loop Modulator.

Olaker et al. U.S. Patent 6,549,562 B1 discloses "Method And System Of Generating A Modulated Chirp Signal".

Riley U.S. Patent 4,965,31 discloses "Frequency Synthesizers Having Dividing Ratio Controlled By Sigma-Delta Modulator".

Cairns U.S. Patent 6,707,857 B1 discloses "Reference Signal Pre-Distortion For Transmitter With Frequency Synthesizer Based Phase Encoding".

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

Khanh cong Tran 03/03/2005
Examiner Tran, Khanh